Office européen des brevets



EP 1 349 009 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3: 22.12.2004 Bulletin 2004/52

(51) Int Cl.7: G03F 7/20

(11)

(43) Date of publication A2: 01.10.2003 Bulletin 2003/40

(21) Application number: 03251611.4

(22) Date of filing: 17.03.2003

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: 18.03.2002 EP 02251933

(71) Applicant: ASML Netherlands B.V. 5504 DR Veldhoven (NL)

(72) Inventor: Dierichs, Marcel Mathijs Theodore Marie 5914 WR Venio (NL)

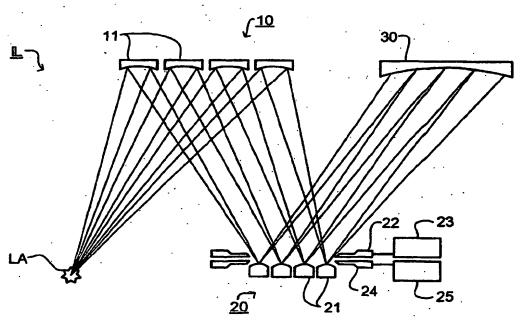
(74) Representative: Leeming, John Gerard
 J.A. Kemp & Co.,
 14 South Square,
 Gray's Inn
 London WC1R 5JJ (GB)

(54) Lithographic apparatus and device manufacturing method

(57) In an illumination system using mirrors, the facets of a field facet mirror focus plural source images on respective facets of a pupil facet mirror to perform the function of an integrator. A facet masking means is provided for selectively blocking facets of the filed or pupil

facet mirrors. The facet masking means has a grid selectively interposable in the projection beam to provide intermediate illumination settings. The grid has a spacing smaller than the source images but larger than the wavelength of the projection beam so that there is no diffraction.

Fig. 2



Printed by Jouve, 75001 PARIS (FR)



EUROPEAN SEARCH REPORT

Application Number EP 03 25 1611

US 6 225 027 B1 (62 1 May 2001 (2001-05 * column 11, line 4 claims 1,7,9,12,17, 1A,5A,14A,14B * DE 199 35 568 A (FA 15 February 2001 (2 * page 5, lines 20- figures 3,4A,5,6A-6 EP 0 939 341 A (NIK 1 September 1999 (1 * claims 44-49 *	25027) -01) 8 - column 12, line 5 23-26; figures CARL ZEISS) 001-02-15) 23; claims 1,7,19; D * ON CORP.) 999-09-01) LITHOGRAPHY SYSTEMS,	1-12	CLASSIFICATION OF THE APPLICATION (Int.CI.7) G03F7/20
1 May 2001 (2001-05 * column 11, line 4 claims 1,7,9,12,17, 1A,5A,14A,14B * DE 199 35 568 A (FA 15 February 2001 (2 * page 5, lines 20- figures 3,4A,5,6A-6 EP 0 939 341 A (NIK 1 September 1999 (1 * claims 44-49 * EP 1 026 547 A (SVG INC.) 9 August 2000 * claims 43,47,48,5	-01) 8 - column 12, line 5 23-26; figures CARL ZEISS) 001-02-15) 23; claims 1,7,19; D * ON CORP.) 999-09-01) LITHOGRAPHY SYSTEMS, (2000-08-09)	1; 1-12	G03F7/20
15 February 2001 (2 * page 5, lines 20- figures 3,4A,5,6A-6 EP 0 939 341 A (NIK 1 September 1999 (1 * claims 44-49 * EP 1 026 547 A (SVG INC.) 9 August 2000 * claims 43,47,48,5	001-02-15) 23; claims 1,7,19; D * ON CORP.) 999-09-01) LITHOGRAPHY SYSTEMS, (2000-08-09)	1-12	
1 September 1999 (1 * claims 44-49 * EP 1 026 547 A (SVG INC.) 9 August 2000 * claims 43,47,48,5	999-09-01) LITHOGRAPHY SYSTEMS, (2000-08-09)		
INC.) 9 August 2000 * claims 43,47,48,5	(2000-08-09)	1-12	
HS 5 330 346 A (WHT			
16 August 1994 (199	4-08-16)	1-12	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
		1-12	G03F
12 March 2003 (2003	-03-12)	1-12	
2 May 2002 (2002-05 * page 7, lines 8-2	-02) 9 *	1-12	
The present search report has b	peen drawn up for all claims		
Place of search		,	Examiner
		l l	niele, N
ATEGORY OF CITED DOCUMENTS icularly relevant if taken alone icularly relevant if combined with anothiment of the same category inclogical background	T : theory or prin E : earlier paten after the filling D : document cit L : document cit	ciple underlying the document, but pub date ed in the application ed for other reasons	e invention lished on, or n
	16 August 1994 (199 * claims 1,3,12-16 EP 1 109 067 A (ASM 20 June 2001 (2001- * claim 1 * EP 1 291 721 A (ASM 12 March 2003 (2003) * paragraphs [0027] EP 1 202 101 A (CAR 2 May 2002 (2002-05) * page 7, lines 8-2 * page 7, lines 8-6 * page 7, line 56 - figures 5A,5B,6A * The present search report has be reported by the search and the search and the search and the search report has be reported by relevant if taken alone coularly relevant if taken alone coularly relevant if taken alone coularly relevant if taken alone ment of the same category	16 August 1994 (1994-08-16) * claims 1,3,12-16 * EP 1 109 067 A (ASM LITHOGRAPHY B. V.) 20 June 2001 (2001-06-20) * claim 1 * EP 1 291 721 A (ASML NETHERLANDS BV) 12 March 2003 (2003-03-12) * paragraphs [0027] - [0033]; claim 1 * EP 1 202 101 A (CARL ZEISS) 2 May 2002 (2002-05-02) * page 7, lines 8-29 * * page 7, lines 8-29 * * page 7, line 56 - page 8, line 5; figures 5A,5B,6A * The present search port has been drawn up for all claims Place of search page 8, line 5; figures 5A,5B,6A * T: theory or print and the search port of the search page 8, line 5; figures 5A,5B,6A * T: theory or print and the search polarly relevant if toombined with another ment of the same category no logical background serviteen disclosure to the search after the filing D: doournent of the search category in the search polarly relevant if toombined with another ment of the same category in cological background serviteen disclosure at the search after the filing D: doournent of the search category in cological background serviteen disclosure at the search after the filing D: doournent of the search after the filing D:	# claims 1,3,12-16 * EP 1 109 067 A (ASM LITHOGRAPHY B. V.) 20 June 2001 (2001-06-20) * claim 1 * EP 1 291 721 A (ASML NETHERLANDS BV) 12 March 2003 (2003-03-12) * paragraphs [0027] - [0033]; claim 1 * EP 1 202 101 A (CARL ZEISS) 2 May 2002 (2002-05-02) * page 7, lines 8-29 * * page 7, lines 8-29 * * page 7, line 56 - page 8, line 5; figures 5A,5B,6A * The present search report has been drawn up for all claims Place of search Munich 28 October 2004 The CYEGORY OF CITED DOCUMENTS cularly relevant if taken abone coularly relevant if taken abone coularly relevant if our bined with another ment of the same category nological background written disclosure # : merriber of the same patent family about the same patent taken abone coularly relevant if combined with another ment of the same category nological background written disclosure # : merriber of the same patent family about the same patent taken abone coularly relevant if combined with another ment of the same category * in the coulent of the same patent taken abone coularly relevant if taken abone category * in the counter of the same patent taken abone category * in the counter of the same patent taken abone category * in the category about the counter of the same patent taken abone category * in the category about the category * in the category about the category * in the category about the category * in the category *

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 03 25 1611

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-10-2004

Patent document cited in search report		Publication date	1	Patent family member(s).		Publication date
US 6225027	B1	01-05-2001	US	6118577	A	12-09-20
	•		US		B1	03-04-20
			ĀŪ		Ā	28-02-20
			DE		Π̈́1	07-02-20
			EP		ÄĪ	30-05-2
			JP		T	23-07-20
		•	WO	0008526		17-02-20
		ÜS		B1	04-09-20	
		ÜS		B1	22-10-20	
		AU		A	29-08-20	
			WO	0048043		17-08-20
DE 19935568	Α	15-02-2001	DE	19935568	 Д1	15-02-20
	• •	20 02 2002	DE		UI	21-12-20
			WO	0109684		08-02-20
			WO	0109681		08-02-20
			EP		A2	02-05-20
		•	EP	1200879		02-05-20
			EP		A1	03-07-20
			ĒΡ		A1	11-09-20
			ĴΡ		Ť	18-02-20
			JP		'	18-02-20
		•	TW		B	11-01-2
			TW	490597		11-01-20
			US	2003002022		02-01-20
			US	2003076607		24-04-20
EP 0939341	Α	01-09-1999	JP	11312638	 Δ	09-11-19
	• •	0_ 00	ĒΡ	0939341		01-09-1
			ŪS		A1	25-07-2
			US		A1	18-07-2
			ÜŠ	2002191170		19-12-20
			ÜS		B1	17-09-20
			ÜS	2004084632		96-05-20
			US	2004090609		13-05-20
		•	US	2004085645		06-05-2
EP 1026547	Α	09-08-2000	US	6195201	 R1	27-02-20
21 20200 17 /1			CA	2296899		27-07-20
			EP	1026547		09-08-20
			JP		A	11-08-20
			KR		Ä	25-09-20
US 5339346	Α	16-08-1994	CA	2121819	 A1	21-11-19
- • •			DE	69421447		09-12-19
			DE	69421447		96-97-20
			_		_	

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 03 25 1611

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-10-2004

HK 1005836 A1 28-04-2000 JP 3291393 B2 10-06-2002 JP 7169677 A 04-07-1995 EP 1109067 A 20-06-2001 EP 1109067 A2 20-06-2002 JP 2001217188 A 10-08-2003 TW 546550 B 11-08-2003 US 2003214643 A1 20-11-2003 US 2003214643 A1 17-05-2003 EP 1291721 A 12-03-2003 EP 1291721 A1 12-03-2003 JP 2003178969 A 27-06-2003 US 2003063266 A1 03-04-2003 EP 1202101 A 02-05-2002 DE 10053587 A1 02-05-2003 EP 1202101 A 02-05-2002 EP 1202101 A2 02-05-2003 EP 1202101 A2 02-05-2003 JP 2002198309 A 12-07-2003 JP 2002203784 A 19-07-2003 JP 2002203784 A 19-07-2003 US 2002141071 A1 03-10-2003 US 2002136351 A1 26-09-2003	HK 1005836 A1 28-04-2000 JP 3291393 B2 10-06-2002 JP 7169677 A 04-07-1995 EP 1109067 A 20-06-2001 EP 1109067 A2 20-06-2001 TW 546550 B 11-08-2003 US 2003214643 A1 20-11-2003 US 2001001247 A1 17-05-2001 US 2003178969 A 27-06-2003 US 2003178969 A 27-06-2003 US 2003063266 A1 03-04-2003 EP 1202101 A 02-05-2002 DE 10053587 A1 02-05-2002 EP 1202101 A 02-05-2002 DE 20100123 U1 23-05-2002 EP 1202101 A2 02-05-2002 EP 1202101 A2 02-05-2002 EP 1202101 A2 02-05-2002 ID 2002198309 A 12-07-2002 JP 2002198309 A 12-07-2002 US 2002141071 A1 03-10-2002 US 2002141071 A1 03-10-2002 US 2002136351 A1 26-09-2002	Patent document cited in search report		Publication date		Patent family member(s)		Publication date
TW 546550 B 11-08-2003 US 2003214643 A1 20-11-2003 US 2001001247 A1 17-05-2003 EP 1291721 A 12-03-2003 EP 1291721 A1 12-03-2003 JP 2003178969 A 27-06-2003 US 2003063266 A1 03-04-2003 EP 1202101 A 02-05-2002 DE 10053587 A1 02-05-2003 EP 1202101 A 02-05-2002 DE 20100123 U1 23-05-2003 EP 1202101 A2 02-05-2003 EP 1202101 A2 02-05-2003 JP 2002198309 A 12-07-2003 JP 2002203784 A 19-07-2003 US 2002141071 A1 03-10-2003 US 2002136351 A1 26-09-2003	TW 546550 B 11-08-2003 US 2003214643 A1 20-11-2003 US 2001001247 A1 17-05-2003 EP 1291721 A 12-03-2003 EP 1291721 A1 12-03-2003 JP 2003178969 A 27-06-2003 US 2003063266 A1 03-04-2003 EP 1202101 A 02-05-2002 DE 10053587 A1 02-05-2002 EP 1202101 A 02-05-2002 DE 20100123 U1 23-05-2002 EP 1202100 A2 02-05-2002 EP 1202101 A2 02-05-2002 JP 2002198309 A 12-07-2002 JP 2002203784 A 19-07-2002 US 2002141071 A1 03-10-2002 US 2002136351 A1 26-09-2002	US 5339346	A		HK JP	1005836 3291393	A1 B2	28-04-2000 10-06-2002
JP 2003178969 A 27-06-2003 US 2003063266 A1 03-04-2003 EP 1202101 A 02-05-2002 DE 10053587 A1 02-05-2003 DE 20100123 U1 23-05-2003 EP 1202100 A2 02-05-2003 EP 1202101 A2 02-05-2003 JP 2002198309 A 12-07-2003 JP 2002203784 A 19-07-2003 US 2002141071 A1 03-10-2003 US 2002136351 A1 26-09-2003	JP 2003178969 A 27-06-2003 US 2003063266 A1 03-04-2003 EP 1202101 A 02-05-2002 DE 10053587 A1 02-05-2002 DE 20100123 U1 23-05-2002 EP 1202100 A2 02-05-2002 EP 1202101 A2 02-05-2002 JP 2002198309 A 12-07-2002 JP 2002203784 A 19-07-2002 US 2002141071 A1 03-10-2002 US 2002136351 A1 26-09-2002	EP 1109067	A	20-06-2001	JP TW US	2001217188 546550 2003214643	A B A1	10-08-2001 11-08-2003 20-11-2003
DE 20100123 U1 23-05-2002 EP 1202100 A2 02-05-2002 EP 1202101 A2 02-05-2002 JP 2002198309 A 12-07-2002 JP 2002203784 A 19-07-2002 US 2002141071 A1 03-10-2002 US 2002136351 A1 26-09-2002	DE 20100123 U1 23-05-2002 EP 1202100 A2 02-05-2002 EP 1202101 A2 02-05-2002 JP 2002198309 A 12-07-2002 JP 2002203784 A 19-07-2002 US 2002141071 A1 03-10-2002 US 2002136351 A1 26-09-2002	EP 1291721	A	12-03-2003	JP	2003178969	Α	27-06-2003
		EP 1202101	Α	02-05-2002	DE EP JP JP US US	20100123 1202100 1202101 2002198309 2002203784 2002141071 2002136351	U1 A2 A2 A A A1 A1	23-05-2002 02-05-2002 02-05-2002 12-07-2002 19-07-2002 03-10-2002 26-09-2002
·								

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82